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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/605,990	11/12/2003	Peter A. Habitz	BUR920020122US1	2989

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EXAMINER	
WACHSMAN, HAL D	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 03/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/605,990	HABITZ, PETER A.	
	Examiner	Art Unit	
	Hal D. Wachsman	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2003*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-23* is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3-19-04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. This application is in condition for allowance except for the following formal matters:

a) The Abstract is objected to because it is not entirely directed towards what is new in the art (i.e. refers to "..the use of commercially available device data or simulation and analysis tools."). Appropriate correction is required.

b) The specification is objected to because paragraphs 0021, 0035, 0039, 0074 and 0075, each contain a square shaped drawing between words of the text. In addition, paragraph 0069 contains a rectangular totally darkened background with white lettering which is improper for a specification. Also in various locations of the specification the lettering and/or subscripts are very small in size (37 C.F.R. 1.52) such as in paragraphs 0029, 0030, 0045, 0048, 0056, 0058, 0060, 0062 for example. In addition, paragraph 0046 states "Additional examples would included..." however was this intended to be "Additional examples would have included...". This same paragraph also states "..due the ith conductor..." however was this intended to be "...due to the ith conductor...". Appropriate correction is required.

c) Claims 1, 7, 13 and 19, are objected to under 37 C.F.R. 1.75(i) because each step of these claims are not separated by a line indentation. Appropriate correction is required.

d) Claims 1-23 are objected to under 37 C.F.R. 1.75(a) for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. In claim 1, "ni", "n" and "thi", have not been defined. This same type of problem also occurs in claims 7, 13 and 19. In claim 13, also "F" and "ntot" have not

been defined. Claim 6, lines 2-4, cite "...by using simulation and analysis tools that at least include capacitance/resistance extraction capabilities" however the "at least" here creates ambiguity with respect to what other capabilities the simulation and analysis tools can have. This same type of problem also occurs in claim 18, lines 3-4. Claim 7, line 18, cites "the conductor" however the antecedent basis is plural. Claim 8, line 3, cites "the *scalar* factor F" which lacks clear antecedent basis. This same type of problem also occurs in claim 14, line 3. Claim 13, line 13, cites "each interconnect conductor" which lacks antecedent basis. Claim 13, lines 20-21, cite "indicating a local heating problem exist *with current interconnect conductor...*" which is ambiguous with respect to what is meant by "current interconnect conductor". Claim 17, lines 1-2, cite "wherein thermal conductances..." which it appears should be "wherein said thermal conductances...". The preamble of claim 19 leading into the body of the claim cites "..the computer executable instructions comprising: determining....; converting...."etc. which it appears should be "..the computer executable instructions comprising: instructions for determining....; instructions for converting...." etc. The preambles of claims 20-23 cite "The method of ..." which it appears should be "The computer-readable medium of...". Claims 21-23 are indicated as depending from claim 1, however as there are already similar dependent claims to these that depend from claim 1, the Examiner believes that these claims were actually intended to depend from claim 19. At the end of claim 21, the subscript "MAX" appears to be missing for the variable representing the maximum temperature difference. In the last claim, the claim number ("23.") is missing at the beginning of the first line of the claim. The examiner asks the

applicant to better claim the limitations cited above. While the examiner understands the intentions of the applicant he feels confusion could be drawn from the limitations cited above. Appropriate correction is required.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

2. The following references are cited as being art of general interest: Moran et al. (5, 533,197) which disclose a method to assess electromigration and hot electron reliability for microprocessors, Ditlow et al. (6,868,374) which disclose the testing of the compliance of a distribution of I/O circuits in a semiconductor chip with voltage and electromigration limits and Schultz (US 2003/0014201 A1) which discloses analyzing electromigration and voltage drop effects in wire segments.

3. Claims 1-6 are allowable over the prior art because the prior art does not disclose or suggest: determining temperature differences between conductors from thermal conductances of a thermal conductance matrix; approximating power flow into the conductors with direct current flow due to adjacent conductors with alternating current flow in the integrated circuit from the temperature differences between conductors and the thermal conductances; and then determining a power limit as a function of the maximum temperature difference that ensures reliability of the integrated circuit.

Claims 7-12 are allowable over the prior art because the prior art does not disclose or suggest: determining temperature differences between conductors from thermal conductances; approximating power flow into the conductors with direct current flow due to adjacent conductors with alternating current flow from the temperature differences between conductors and the thermal conductances; and then determining a power limit as a function of the maximum temperature difference for the conductors that ensures reliability of the conductors.

Claims 13-18 are allowable over the prior art because the prior art does not disclose or suggest: determining thermal conductances from at least one of cpacitances and a capacitance matrix; determining a power limit $F*C_{ntot}\Delta T_{MAX}$ as a function of the maximum temperature difference ΔT_{MAX} in accordance with electromigration requirements; checking each interconnect conductor with an alternating current flow to determine if power generated $I_{RMS}*R_{WIRE}^2$ is less than the power limit $F*C_{ntot}\Delta T_{MAX}$; and indicating no local heating problem with an interconnect conductor when power generated $I_{RMS}*R_{WIRE}^2$ is less than the power limit $F*C_{ntot}\Delta T_{MAX}$.

Claims 19-23 are allowable over the prior art because the prior art does not disclose or suggest: determining temperature differences between conductors from thermal conductances of a thermal conductance matrix; approximating power flow into the conductors with direct current flow due to adjacent conductors with alternating current flow in the integrated circuit from the temperature differences between conductors and the thermal conductances; and then determining a power limit as a

function of the maximum temperature difference that ensures reliability of the integrated circuit.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hal D. Wachsman whose telephone number is 571-272-2225. The examiner can normally be reached on Monday to Friday 7:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc Hoff can be reached on 571-272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hal D Wachsman
Primary Examiner
Art Unit 2857

HW
March 17, 2005